# Effect of pulsed electric fields on the recovery of docosahexaenoic acid from Crypthecodinium cohnii

**KATSIMICHAS A. (1), LIMNAIOS A. (1), DIMITRACOPOULOS K. (1), DIMOPOULOS G. (1), STAIKOS S. (2), KARNAOURI A. (2), TOPAKAS E. (2), TAOUKIS P. (1)**

1 Laboratory of Food Chemistry and Technology, School of Chemical Engineering, National Technical University of Athens, Athens, Greece
2 Laboratory of Biotechnology, School of Chemical Engineering, National Technical University of Athens, Athens, Greece

Food industry is in a steadily increasing quest for alternative natural sources of bioactive compounds. Microalgae cultivated on an industrial scale are rich high added value ingredients, such as carotenoids, antioxidants, and polyunsaturated fatty acids. *Crypthecodinium cohnii* is an innovative heterotrophic microalga, containing significant amounts of polyunsaturated fatty acids, mainly docosahexaenoic acid (DHA), of high demand in high nutritional value product formulations. Pulsed electric fields (PEF) cause membrane permeabilization enhancing mass transfer due to exposure of cells to high strength electric fields. The aim of this work was to study the effect of PEF pretreatment of *C. cohnii* cells on the improvement of DHA recovery.
*C. cohnii* (ATCC 30772) was cultivated in modified ATCC 460 $A_2E_6$ medium with 27 g/L glucose for 10 days at 27°C. After harvesting *C. cohnii* biomass, PEF treatment (0-15 kV/cm, 100 pulses) was applied on cells suspension. Thereafter, both untreated and PEF-treated *C. cohnii* cells were mixed with the extraction solvent (hexane-isopropanol in different ratios) and left up to 6 h at ambient temperature under constant stirring. The samples were centrifuged and the organic extract was collected and evaporated under vacuum. Lipids extraction yield was determined gravimetrically. Esterification of lipids to fatty acid methyl esters (FAMEs) was caried out for the identification and quantification of extracted omega-3 fatty acids.
The total lipids extraction yield of untreated cells reached 35.8 % w/w. The percentage of DHA in total fatty acids was 56.1%. The results showed that PEF pretreatment (12.6 kV/cm, 100 pulses) significantly increased the extraction yield of total fatty acids up to 53.7% after 1 h of extraction. Additionally, the increased permeabilization of PEF treated cells resulted in acceleration of extraction process by up to 3.5 h. In conclusion, the production of omega-3 fatty acids from microalga C. cohnii, an established industrial process, can be significantly enhanced by PEF as a pretreatment step for the increase extraction yields and overall process efficiency.